

**STATE OF WISCONSIN WELLHEAD
PROTECTION PROGRAM PLAN FOR PUBLIC
WATER SUPPLIES
Adopted August 1993; Amended May 2012**

Introduction and Purpose

The 1986 amendments to the federal Safe Drinking Water Act (SDWA) (specifically SDWA, 1986, Title XIV, Part C, Section 1428) established a nationwide program to protect groundwater used for public water supplies. It provides protection from a wide range of potential sources of contamination through the establishment of state wellhead protection programs.

A "wellhead protection" (WHP) program includes the concept of a wellhead protection area (WHPA). The SDWA defines a wellhead protection area as the "surface and subsurface area surrounding a water well or well field, supplying a public water system, through which contaminants are reasonably likely to move toward and reach such water well or well field." It also indicates that the size of a wellhead protection area necessary to provide protection from contaminants which may have adverse health effects is to be determined by each state.

The SDWA requires that states develop and submit a wellhead protection program (WHPP) to the United States Environmental Protection Agency (U.S. EPA) for approval. Wisconsin's WHP program contains the following elements:

- **Specification of Duties of State and Local Agencies and Public Water Systems in Developing and Implementing a Program,**
- **Inventory of all Public Water Supply Wellheads,**
- **Delineation of Wellhead Protection Areas (WHPAs),**
- **Listing and Inventory of Potential Contaminant Sources within WHPAs,**
- **Management Approaches,**
- **Contingency Plans,**
- **Protection of New Wells, and**
- **Public Participation.**

This document addresses all of the elements required for a comprehensive statewide wellhead protection program. The description of each of the above elements is expressed in the remainder of this document. Implementation of Wisconsin's WHPP relies on the availability of funding and staff. Congress has not appropriated any monies under the SDWA for states to implement wellhead protection programs. Therefore, full implementation of the state WHPP as described in this document is dependent upon the availability of state and federal monies for comprehensive groundwater protection.

The goal of the federal wellhead protection program is to protect public water supply wellhead areas from contaminants which may have any adverse effects on the health of people. Wisconsin has a goal enumerated in state statutes (s.160.001, Wis. Stats.) of minimizing the concentration of polluting substances in groundwater and providing adequate safeguards for the public health and welfare. The specific goal of Wisconsin's Wellhead Protection Program is to achieve additional groundwater pollution prevention measures within public water supply wellhead areas consistent with the state's overall goal for groundwater protection.

Specification of State and Local Agencies and Public Water Systems in Developing and Implementing a Program

State regulatory authority for groundwater related programs and activities exist in various departments and agencies within the state. These departments, agencies and their associated authorities are listed in Appendix 1.

The Wisconsin Department of Natural Resources (WDNR) has primacy delegation for public water supply systems and supervisory programs in Wisconsin under the Federal Safe Drinking Water Act. The Federal role in the state Wellhead Protection Program (WHPP) will be to produce technical assistance documents to aid communities who are pursuing wellhead protection, and to continue to search for, and provide funding to communities who are enhancing the State WHP program.

The WDNR has been designated as the lead state agency for developing the wellhead protection program in Wisconsin. The Bureau of Drinking Water and Groundwater within the WDNR has the major responsibility for the WHPP.

The WDNR has determined that a voluntary wellhead protection program will be the most effective in Wisconsin. This voluntary program will not only provide increased protection for the public water supplies, but complement and enhance the overall groundwater protection programs that already exist in Wisconsin. WDNR will complete all elements of the state WHPP as defined in the SDWA while allowing for environmentally proactive citizens to enhance the State WHPP for their water supply wells. These enhancements will be supplementary to the state's program and go beyond the requirements established in the SDWA.

The WDNR will delineate a wellhead protection area for all of the public water supply wells in the state. The WDNR will inventory potential contamination sources within the WHPA. The WDNR will also be responsible for the management approaches within all of the delineated wellhead protection areas. Public educational information will be developed and provided to each of the public water suppliers by the WDNR. The WDNR, as in the past, will provide a contingency plan for alternative water sources in the case a public water supply is contaminated. In addition, guidelines for development of public participation to ensure implementation of the WHPP will be developed and distributed to water purveyors across the state. Implementation of the wellhead protection program, review of WHPPs, technical assistance and educational initiatives will be provided by the WDNR.

To facilitate implementation of the wellhead protection program, the Bureau of Drinking Water and Groundwater has developed and incorporated language into chapter NR 811, Wis. Adm. Code, requirements for proposed new municipal wells. Chapter NR 811, Wis. Adm. Code requires that a wellhead protection program be prepared, and submitted by the municipality along with the proposed plans and specifications for any new municipal well in Wisconsin which is to be put into service after April 1, 1992.

In Wisconsin, all federal and state owned facilities, which operate their own water supply systems, and have at least 25 year-round residents, are regarded as municipal water systems, and fall under the requirements of chapter NR 811, Wis. Adm. Code. If they propose to utilize a new water supply they are required to develop a wellhead protection program for that well, all other wellhead protection initiatives will be voluntary in nature.

The WDNR will oversee the local water purveyors progress at enhancing the state WHPP by tracking their efforts through the sanitary survey process. The sanitary survey process will investigate the various aspects of WHP and will determine to what extent the WHPP has progressed at each public water supply. This mechanism will provide the means to target future educational efforts towards those public water purveyors and areas of the state which are not currently enhancing the state program. The mechanism will include a WHPP self assessment for municipalities and a WDNR checklist that will inventory the efforts made by a particular community. This combination of checklists will allow the WDNR to determine whether the particular community has fully implemented enhancements to the state WHPP, has partially implemented enhancements to the state WHPP, or has not implemented a locally initiated WHPP.

The Central Wisconsin Groundwater Center (CWGC) has provided the means to do technical research on pilot studies for wellhead protection. Advice on technical issues was provided during the development and writing of the state's wellhead protection program. The CWGC is targeted to supply information and education to the public during the implementation of the wellhead protection program.

The Wisconsin Geological and Natural History Survey (WGNHS) has conducted substantial research into developing criteria for use in delineation of WHPAs within areas of fractured flow aquifers. They have recently completed and distributed U.S. EPA guidance document number 570/9-91-009 on the Delineation of Wellhead Protection Areas in Fractured Rocks. The WGNHS will continue to conduct groundwater research on parameters involved in wellhead protection. WGNHS has been instrumental in the development of the state's wellhead protection program. In addition, they will supply information and education to the public during wellhead protection program implementation.

The Wisconsin Rural Water Association (WRWA) will be focusing on promoting wellhead protection in communities with populations of less than 10,000 people. Its goal is to inform and educate the populous while promoting the implementation of various elements of wellhead protection in the communities. The WRWA is actively promoting wellhead protection by working with communities to delineate protection areas, develop ordinances to manage the protection area, and by educating the public on the importance of wellhead protection.

The Wisconsin Groundwater Coordinating Council (GCC) was created under state statutes to facilitate inter-agency coordination on state groundwater management efforts. The GCC includes representatives of 7 state agencies plus a representative of the Governor. The WDNR has presented information on the purpose of WHP to the state's Groundwater Coordinating Council on several occasions. The GCC has expressed its support of Wisconsin's WHP efforts. The members of the GCC are agency leaders who facilitate additional communication between agencies. The WDNR intends to supply the GCC and state agencies, with the information and educational materials that are produced. This information indicates the importance of implementing enhancements to the state WHPP for protection of Wisconsin's groundwater resources. With this information, each agency will be able to determine how they will be able to incorporate WHP into their regulatory and non-regulatory programs.

Water purveyors have been involved in the development of the WHPP and will continue to be involved during the implementation phase. Water purveyors future participation will be both regulatory and non-regulatory in nature. They will have the opportunity to implement the various elements of a wellhead protection program above and beyond the state efforts. For delineation, the water purveyor may use the state delineated WHPA, or more accurately delineate the area. In addition, water purveyors may decide to implement additional contaminant source management strategies which would be complementary to the state management approach. To be successful, enhanced local wellhead protection programs will

need a core group of local officials and interested citizens to educate the populous to ensure the success of WHP.

State agencies with regulatory authority with regards to groundwater, and other organizations involved in the development of this wellhead protection program believe that the success of the voluntary wellhead protection program is inevitable. To facilitate this success, regulatory agencies will take into consideration the concept of WHP when promulgating future rules. In addition, each agency that has regulatory authority over specific potential contamination sources will continue to update their data and provide this information to citizens of the state.

A summary of the responsible entities for wellhead protection at the various types of public water supply wells has been included as Table 1.

Table 1

**Wellhead Protection Responsibilities
for
Public Water Supply Wells**

Type of Water Well	Delineation			Contaminant Source Inventory		Management	
	Start/End	Method	Responsibility	Start/End	Responsibility	Start /End	Responsibility
Non-Community*	Complete	Fixed Radius	State/ Voluntary Local Plans	As Scheduled For Inspection	State/ Voluntary Local Efforts	Complete	WDNR/ Voluntary Local Plans
Other Than Municipal*	Complete	Fixed Radius	State/ Voluntary Local Plans		State/ Voluntary Local Efforts	Complete	WDNR/ Voluntary Local Plans
New Municipal Wells	As Needed	Various	Owner	As Needed	Owner	As Needed	Owner/WDNR
Existing Municipal Wells*	As Scheduled in Sanitary Survey	Calculated Fixed Radius	State/ Voluntary Local Plans	As Scheduled in Sanitary Survey	State/ Voluntary Local Efforts	Complete	WDNR/ Voluntary Local Plans

* Program enhancements by the community or the well owner will be encouraged by WDNR.

Inventory of all Public Water Supply Wellheads

An inventory of all Public Water Supply (PWS) wellheads is an essential key to any complete wellhead protection plan. Public water supply wellheads have been divided into three categories for the inventory process. The categories are:

- 1) Municipal water system,
- 2) Other than municipal water system,
- 3) Non-community water system.

A "municipal water system" is defined as a "community water system" which is owned by a city, village, county, town, town sanitary district, utility district or a federal, state, county, or municipally owned institution for congregate care or correction, or a privately owned water utility serving any of the above.

A "community water system" is defined as a public water system which serves at least 15 service connections used by year-round residents or regularly serves at least 25 year-round residents. Any water system serving 7 or more homes, 10 or more mobile homes, 10 or more apartment units, or 10 or more condominium units shall be considered a community water system unless information is available to indicate that 25 year-round residents will not be served.

A "public water system" is defined as a system for the provision to the public of piped water for human consumption, if such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily at least 60 days out of the year. A public water system is either a "community water system" or a "noncommunity water system".

An "other than municipal water system" (OTM) is defined as a "community water system" which is not owned by a city, village, county, town, town sanitary district, utility district or a federal, state, county, or municipally owned institution for congregate care or correction, or a privately owned water utility serving any of the above. Examples of OTMs are: mobile home parks, condominiums or apartment subdivisions.

A "non-community water system" is defined as a "public water system" that is not a "community water system". Examples of non-community systems are: parks, industries, waysides, service stations, restaurants or schools.

The following information for each type of public water supply has been compiled and includes: the facility identification number; owners name; owners address; owners city; well location; well identification number and well depth.

A total of 19,047 public water supply wells have been identified in Wisconsin. Of these 1,584 are municipal water system wells, 1,125 OTM wells and 16,338 non-community water system wells.

Additional information pertaining to the installation date, well depth or intake length, water bearing formation, type of treatment, other physical facilities, and inorganic water chemistry data is available for some of the public water supplies. This information is available from the Bureau of Water Supply (**now the Bureau of Drinking Water and Groundwater**) and will be used as a resource when specific WHPAs are delineated.

New public water supplies will be incorporated into the inventory upon their approval.

Delineation of Wellhead Protection Areas

The WDNR will delineate wellhead protection areas for all public water supply wells. Methodology for delineating wellhead protection areas has been established. However, the WDNR's intent is not to eliminate other methods of delineation which may be considered. In fact, the WDNR encourages local governments, or their agents, to perform more sophisticated delineation of their WHPAs and will provide technical assistance to achieve the more accurate delineations as funding permits. A public water supply owner has the option to select an alternative method to more accurately define a wellhead protection area for a public water supply. If the water supplier decides to more accurately and protectively define the WHPA using a more accurate EPA recommended delineation methodology, then the voluntarily delineated WHPA will automatically be accepted by the WDNR as a substitute for the state delineated WHPA. In automatically accepting the locally delineated WHPA, WDNR reserves the right to reconsider that acceptance in the future. If in the future, the accuracy or reasonableness of the refined WHPA comes into question, then the WDNR may review the criteria used to delineate the WHPA and make a determination as to its accuracy and reasonableness. If the WHPA is determined to be unreasonable, then the WDNR will advise the community in developing a more accurate WHPA. In addition, municipalities have regulative authority to adopt or improve upon the standards which the state has set. The WDNR will track the municipalities and other water purveyors that choose to delineate a more accurate WHPA through the previously mentioned sanitary survey process. The intent of delineating a WHPA for a well is to manage all or part of the recharge area to minimize the potential for contamination of the well.

In Wisconsin, all groundwater is treated equally, a confined aquifer has the same designation and protection that an unconfined or a fractured/karst aquifer has. While it is understood that the calculated fixed radius method for determining the WHPA for a confined aquifer well may not as adequately protect that well from contamination as would a more sophisticated delineation methodology, it is financially, the only feasible method to use. If federal funds were available for delineation, the WDNR would be able to undertake a more detailed analysis.

Initial delineation of municipal water systems will be accomplished by using the "calculated separation distance" method to estimate a five year time of travel. The method selected does have limitations and other methods may better estimate the actual zone of contribution or recharge area that contributes water to the well. The method's limitations increase the chances that some areas within the WHPA may not be contributing water to the well, while other areas outside the WHPA are providing water to the well. Because of these limitations, WDNR encourages local governments to perform more sophisticated delineations of their WHPAs. As part of the information and education effort, the WDNR has produced and provided to all the municipal water systems a technical assistance document (TAD) on delineation methodologies. In addition, this TAD has been made available to all other types of public water systems. Included in this TAD is a discussion of delineation methodologies which can be used to define a WHPA including their limitations and comparisons. This TAD is included as Appendix 2. Also included as Appendix 3, Part 2, is a set of examples which compare the calculated fixed radius method for determining a WHPA, with other more advanced methods which also may be used to determine WHPA boundaries.

The Department has separated municipal water systems from other than municipal systems (OTMs) and non-community public water supply wells for the delineation of WHPAs. The division of public water supplies into three categories, for the WHPP, was established by taking into account several factors. The primary factor was the amount of legal authority that each of the various types of water purveyors possess. Owners of municipal water supply systems have legal authority to impose zoning requirements for areas within the municipality. This authority is lacking for both the owners of OTMs and non-community water systems.

Wellhead protection areas for municipal water systems will be delineated using the best available hydrogeologic information. The success of the wellhead protection program depends on the flexibility of being able to apply different methodologies, or combination thereof, for differing situations. However, to begin the program, an initial delineation of the WHPA must be made. Initial delineation of municipal water systems will be accomplished by using the "calculated separation distance" method. The initial order in which public water supply delineation will be completed, parallels the sanitary survey schedule. The WDNR intends to delineate WHPA's for the wells that are scheduled to be reviewed by the Public Water Supply Section (sanitary survey) during the upcoming year, just prior to their survey. Beginning with the approval of the State Wellhead Protection Program, the delineation portion of the WDNR effort will be completed within the sanitary survey time frame, or approximately 10 years.

The calculated separation distance method determines the wellhead protection area for a specific well using the properties of the aquifer at the well site. This involves determination of the point or radius outward from the wellhead that will protect it from contamination during a set period of time. To determine this radius, a time-of-travel (TOT) is specified, the pump's maximum pumping rate and the height of the saturated interval for the wellhead is determined and the specific site's aquifer media porosity is estimated.

The formula to determine the calculated separation distance is:

$$r = [(Qt)/(\pi nH)]^{1/2}$$

Where: Q= Pumping Rate of the Well in Feet³/Year

n= Porosity

H= Height of Saturated Interval in Feet

t= Time of Travel to the Well is Established to be 5 Years

r= Radius of WHPA Around Pumping Well in Feet

π = 3.14

Values for porosity have been determined for the various aquifer materials in the state. These values, in Table 2, have been used in studies, by the Wisconsin Geological and Natural History Survey, and have proven to be reasonable for use in this state. In addition, these values are in accordance with the range established for porosity listed in Table 2.4 of Freeze and Cherry, 1979.

<u>Table 2</u>	
<u>Aquifer Material</u>	<u>Porosity (n)</u>
Sand & Gravel/Drift	.3
Sandstone	.3
Fractured Granite	.05
Dolomite/Limestone	.05

A number of case studies to determine the radii of WHPAs in various hydrogeologic settings and groundwater withdrawal rates have been completed. Information relative to each of these sites is in Appendix 3, Part 1. Also included in Appendix 3 is a summary of how the WDNR, in cooperation with other agencies, determined that a 5 year time-of-travel will adequately protect the state's drinking water supply.

For new municipal wells, the applicant will be required to delineate the WHPA for a time of travel of no

less than 5 years. The formula above may be used or the applicant may conduct a hydrogeologic investigation and utilize an alternate methodology listed in Appendix 2. Appendix 4 contains section NR 811.16(5), Wis. Adm. Code, which specifies minimum wellhead protection criteria for future municipal water supplies.

For OTMs and non-community water supplies, the fixed separation distance method will be used to establish wellhead protection areas. The fixed separation distance method establishes the radius of a circular area, centered on the pumping well, in which varying types of potential pollution sources are not allowed or restricted. An area with a radius of 1200 feet is established for the WHPA. This method of delineating the WHPA is designed to influence siting and location of potential sources relative to OTMs and non-community water supplies designated for protection. In many respects, such a groundwater protection measure or siting requirement is similar to a community zoning ordinance.

Delineation Methodology for Municipal Water Systems.

Municipal water system delineation methodology was determined by considering several factors. These factors were legal authority, staff and funding availability, accuracy of delineation methodology, delineation time & associated cost analysis and other agency input.

The legal authority that a municipal water purveyor controls is quite extensive. This authority has been outlined in the body of this WHPP in the section on Management Approaches. Management Approaches highlights both regulatory and non-regulatory mechanisms that a municipality possesses. In brief, the regulatory portion indicates that a municipality has the legal authority to protect the WHPA by the use of various types of zoning ordinances.

The reliability of various delineation methodologies has been accurately established in many publications. The reliability of the delineation correlates directly to the amount of site specific information available, and in most cases, the amount of time & money spent for delineation. Delineation methodologies are listed in order of increasing accuracy, complexity and cost. The methods are fixed separation distance; calculated separation distance; geologic/hydrogeologic mapping with uniform flow equation; analytical flow models; and numerical flow/transport models.

Minimum delineation time, associated cost analysis and transfer of information to hard copy maps needed for the 1,584 municipal water supply systems has been determined for the three least accurate wellhead protection delineation methods. The two more accurate methods are assumed to take more time, money and data for delineation and were deemed impractical to implement on a statewide basis. Dollar figures are based on the assumption that it costs 50,000 dollars per year, per staff person. The fixed radius method will take approximately 13 weeks and 13,000 dollars. This also assumes that it will take only eleven weeks to locate and plot all the municipal water supply system wells on 7.5 minute U.S.G.S. quadrangle maps. These quadrangle maps will eventually be a mechanism to display the delineated WHPA to citizens and local decision makers and will act as the base map for eventual computerization of the WHPA information. Calculated fixed radius will take the eleven weeks of time allocated above plus approximately ten weeks for other analysis involved with this method. At a minimum, a total of 21 weeks and 21,000 dollars would be needed to implement this delineation method. Geologic/hydrogeologic mapping with uniform flow equation delineation would take at a minimum of 1 day per municipal well or a total of 1,584 days for delineation. However, a staff person will not be able to devote his or her total time to delineation. A percentage of the communities that have already been delineated will be requesting further assistance or clarifications of how the WHPA was delineated. After the first year of delineation at least one day of each week will undoubtedly be needed for this type of assistance. After two years an additional day would be set aside for this type of assistance. Hopefully, no additional public assistance time would be needed during the following years. If this estimate of total time for delineation and response is met, then for municipal water supplies it would take a minimum of

2,435 working days or 9.7 years and 470,000 dollars to fund this effort.

Other agencies and groups working with WHP activities were asked to comment on delineation methods given the above information. The agencies/groups commenting were the University of Wisconsin System, Central Wisconsin Groundwater Center, U.S. Soil Conservation Service (**now the U. S. Natural Resources Conservation Service**), WGNHS, Golden Sands Resource Conservation & Development Area and the Wisconsin Rural Water Association. The comments were in general agreement that it would be ideal to use the most accurate method possible for delineation of wellhead protection areas. However, this is not possible providing the funding available. It was agreed that given the funding available, it would most benefit the state if all public water supply WHPA's would be delineated quickly and at the same time launch an aggressive public education campaign. After the first phase delineation was complete, while continuing the education campaign, it would be ideal to begin a second phase delineation by geologic/hydrogeologic mapping combined with the uniform flow equation for a more accurate delineation. If this were attempted, due to the enormity of this secondary delineation, it would be spread out over many years.

To determine which delineation method would be chosen, all of the above factors were weighed. It is clear that to be cost effective, while protecting the resource with the funding available, that a calculated fixed radius would be the most effective for Wisconsin. The TOT was determined for this method by working through the calculations for several municipal water supplies in various geologic settings. Many factors were taken into account when deciding between five and ten year time of travel. However, the over-riding factor in determining which TOT to use was the difficulty a municipal water purveyor would have to actually get zoning ordinances adopted and implemented, for a larger calculated fixed radius, on the ground surface. Calculated fixed radius delineation using both the 5 and 10 year time of travel, in cases examined, exhibited WHPAs with radii of approximately 1200 feet or greater. The 10 year TOT calculations produced larger radii for each calculation. For the 5 year TOT, if the case arises where a radius is determined to be less than 1200 feet, it will be reset to 1200 feet to establish the protection zone. Coupling the protection this setback distance has provided in the past, with the intensive education effort which will be pursued during the implementation of Wisconsin's WHPP, the five year TOT was chosen.

Delineation Methodology for Other Than Municipal Water Systems and Non-community Water Systems.

How was the delineation method chosen for other than municipal water systems and non-community water systems? For other than municipal systems and non-community water systems, the WDNR took into account the factors that were indicated for the delineation of municipal water supply systems. However, the over-riding factor was the amount of legal authority the water purveyor controls.

The legal authority that water purveyors of non-community and other than municipal systems is limited to the extent of their property boundary. They do not have the legal authority to impose any regulations outside of their properties. The owners of non-community wells and other than municipal wells must rely on cooperative efforts with the adjacent landowners to enhance the States management of their WHPA. These well owners may also approach the city and county regulatory agencies to determine what local options they may have or the resources that they may use to manage the WHPA.

Other agencies and groups working with WHP activities were asked to comment on delineation methods taking into account the various factors. The agencies/groups commenting were as listed in the delineation of municipal water system section. The comments were in agreement that it would be ideal to use the most accurate method possible for delineation of wellhead protection areas. However, this is not possible providing the funding available and the legal authority that these water supply systems possess. An additional factor is that 1200 feet is the maximum separation distance to any potential contaminant source found in the water supply code. It was agreed that given the amount of legal

authority that OTMs and non-community water supplies possess, an arbitrary fixed radius delineation would be the most reasonable and effective. It is deemed that a set fixed radius of 1200 feet is the minimum distance established for a WHPA will continue to provide protection for these types of water supplies.

Listing and Inventory of Potential Contaminant Sources within WHPAs.

An essential element of Wisconsin's Wellhead Protection Program is the inventory of potential groundwater pollution sources in and around designated WHPAs. The three steps of the source identification and inventory process (determine potential pollution sources, acquire existing lists of regulated potential contamination sources and field locate unregulated potential sources) will be carried out by the Bureau of Drinking Water and Groundwater during the sanitary survey process. Currently the sanitary surveys are completed during a set time period. Municipal wells are surveyed once in a 5 year period, while OTMs and non-community water systems are surveyed once every 10 years. It is intended that WDNR will carry out these surveys on schedule, however, it must be remembered that these surveys are an on going process and that each well has its position in the inventory cycle and will be inventoried during one of the set cycles.

The WDNR will continue to encourage water purveyors to inventory the WHPA surrounding their water well. It has provided to the water purveyors, a guide which will take an individual, step by step, through the three step inventory process. The guide contains an inventory list; inventory form; access routes to existing inventory lists; description of what type and scale map should be used; and other ideas which will simplify the task (see Appendix 5). This guide may be used by a community which is interested in developing a WHPP prior to the effort accomplished by the WDNR.

Any information obtained during a WDNR PWS contaminant inventory will be provided to the public water supply purveyors either in paper copy or in a computer format. The sanitary survey will provide a means for public water supplies contaminant source inventories to be kept up to date. This does not preclude the public water supply purveyor from inventorying the potential contaminants to the water supply on a more frequent basis.

The inventory is a three step process. The WDNR has the responsibility for the completion of all three steps, however the public water supply owner may choose to begin the inventory process before the WDNR conducts its routine sanitary survey. The first step is to determine what should be inventoried. The second step is to acquire and access existing lists that inventory specific sources. The third step is to, on a site specific basis, field locate sources that have been identified on existing lists and to inspect for other potential contaminants that exist in the wellhead protection area. The field inventory must be customized to fit the needs and concerns of the community. WDNR staff currently conducts sanitary surveys of public water supplies. WDNR will utilize these inspections and surveys to inventory and assess potential contamination sources within WHPAs.

Step 1:

The initial step of inventorying is to determine what are the potential pollution sources for each wellhead. A listing of potential contaminant sources which will be inventoried are listed in Table 3. It should be noted that this list is not all inclusive. There are other potential sources or practices which can pose a threat to groundwater, are outlined, in detail, in the inventory technical assistance document.

Table 3
List of Potential Contaminant Sources

1. Underground Petroleum Product Tanks
2. Leaking Underground Storage Tanks
3. Waste Disposal Sites
4. Toxic Chemical Storage (SARA: 311, 312, 324)
5. Toxic Chemical Use/Emissions (SARA 313)
6. Hazardous Substance Spills
7. Hazardous Waste Sites
8. Class V Injection Wells
9. Licensed Fertilizer Facilities of Blended Fertilizer
10. Licensed Pesticide Mixing, Loading or Selling Facilities
11. Licensed Dealers of Restricted Use Pesticides
12. Salt Storage
13. Storm and Sanitary Sewers
14. Septic Systems
15. French Drains, Drainage Wells
16. Sludge and Wastewater Spreading
17. Irrigation
18. Animal Feedlots
19. Livestock Waste Storage
20. Livestock Waste Spreading
21. Fertilizer Application
22. Pesticide Application
23. Transmission Pipelines
24. Road Salting
25. Hazardous Materials Transport by Truck or Rail
26. Salvage Yards
27. Infiltration Lagoons
28. Chemical Stock Piles
29. Dry Cleaners
30. Wells No Longer in Use
31. Petroleum Storage Tanks.

Step 2:

The second step is to acquire and access existing lists that inventory the specific potential contamination sources identified in step 1. A listing of access routes, which an individual can use to receive copies of specific lists of potential sources 1 through 12 of Table 3, is contained in the Technical Assistance Document: "A Guide for Conducting Potential Contaminant Source Inventories for Wellhead Protection" which is included as Appendix 5.

To determine if the other potential pollutant sources listed in Table 3 are present in a specific wellhead protection area information may be obtained from:

1. State Agencies
2. Consulting Reports
3. State and Federal Publications
4. Unpublished Information and Maps from the Municipality
5. Correspondence with State and Local Officials

6. Field Checking
7. Historic Review of the Area by the use of Aerial Photographs or with Members of the Community

Step 3:

The third, and most essential step in the potential pollutant source inventory process is to field locate sources that have been identified on existing lists, obtained in step two, and to inspect for other potential contaminant sources that exist in the wellhead protection area for all public water supply wells. Field location will confirm the inventory compiled in the office and identify additional potential pollution sources and other practices which have the potential to contaminate groundwater within the WHPA.

Potential pollution sources and land use inventories will be plotted on a map of the area. This information will later be transferred to a stable base map on the scale of 1:24,000 to facilitate eventual computerization. This will aid in identifying those facilities in areas with the greatest risk to the public water supply.

When a community is interested in developing a WHP plan before the WDNR delineates the WHPA and conducts the sanitary survey, they will have WDNR resources to work from. The WDNR has produced a set of technical assistance documents (TAD) that will aid them in their efforts.

WDNR will develop site specific inventories of contamination sources within WHPAs in the following manner:

New Municipal Wells: Before a new municipal well is approved by WDNR, the applicant will be required to submit for approval a WHP plan for that well. The WHP plan shall include an inventory of contamination sources. See Appendix 4 which contains section NR 811.16(5), Wisconsin Administrative Code.

Existing Wells: WDNR will use a combination of Water Supply program requirements, the sanitary survey process and technical assistance to municipalities to obtain site specific contamination source inventories at public water supply wells.

Maintaining an accurate and comprehensive inventory and assessment of potential pollution sources within the WHPA will be an on-going effort. It will require continual updating and oversight. This information will greatly assist in the making of state and local decisions concerning the protection of the potable water supply.

The WDNR intends to maintain contact with communities that are working on or have WHP plans in place. The WDNR will encourage the community leaders to periodically review and maintain the accuracy of the inventory lists and to provide the WDNR with copies of these lists as they are completed. At a minimum, the source inventory that was completed during the previous sanitary survey will be provided to the water purveyor after the survey has been completed. With this survey in hand, the water purveyor will be able to update the source inventory and then work with the engineer that is conducting the sanitary survey to review and verify the additions to the inventory.

The WDNR will inventory a 1200' radius around non-community and other than municipal wells on a scheduled cycle. Through the process of sanitary surveys, routine inspections and vulnerability assessments, the WDNR will continually improve upon the inventory that was obtained during the initial vulnerability assessment.

A brief background on vulnerability assessments is as follows. On January 30, 1991 U.S.EPA published final regulations (40 CFR Part 141) containing monitoring requirements for public water supplies. These public water supply monitoring regulations provide for waivers of certain monitoring requirements for volatile organic chemicals, inorganics, PCBs, and pesticides, based upon vulnerability assessments of public water supply wells. The federal regulations specify that the elements of a vulnerability assessment include a 1) state determination of whether the chemicals have previously been used "within the watershed or zone of influence" of the well and 2) a state determination of the "proximity of the water system to potential point of non-point sources of contamination." Therefore, vulnerability assessments conducted by WDNR's drinking water program will generate partial contaminant source inventories that can be used as the basis for the inventory of contaminant sources in the wellhead protection program.

Management Approaches

Groundwater protection, in the long run, needs to be prevention oriented to be truly effective. This is because full restoration of groundwater quality can be very difficult and costly once contamination occurs. To prevent contamination and to be the most effective, management of the WHPP must begin with comprehensive state-wide regulatory programs and community involvement at the local level.

The Wisconsin Wellhead Protection Program has been developed to meet all of the requirements of the Safe Drinking Water Act (SDWA). The state regulatory programs working concurrently with a comprehensive state-wide information and education campaign, a facilitated incentive approach for geographic target areas, and any voluntary efforts from the local level will provide the drinking water resources of Wisconsin with the protection that is intended by the SDWA.

State regulatory separation distance requirements between public water supply wells and potential contamination sources, in addition to the regulations regarding potential pollution sources and land use controls, will be the primary state regulatory means for managing the wellhead protection area. These regulations along with the information and education strategy, and the facilitated incentive approach for geographic target areas, effectively form a solid foundation for Wisconsin's wellhead protection program. However, Wisconsin considers the voluntary local management efforts to be an integral component of an effective wellhead protection program.

State Management

The state provides regulatory management through the WDNR and other agencies. Drinking water supplies receive protection from potential sources of groundwater contamination by the use of siting regulations. These regulations act in two ways, directly through specific distance restrictions between potential contamination sources and water supplies, and indirectly by regulating potential contamination sources and land uses.

The manner in which the regulations act through specific distance restrictions is by regulating the spatial relationships between public water supply wells and potential contaminant sources. This is accomplished by setting a minimum distance from a specific potential contamination source to a water supply well or by setting the minimum distance a water supply well can be from specific potential contamination sources. Regulatory codes which contain these siting restrictions, are listed in Appendix 6. This listing includes the regulator, specific code number and the minimum distances set forth to provide for protection and management from potential pollution source.

Groundwater and public water supplies in Wisconsin are protected indirectly by regulating potential pollution sources and land use. The state has enacted various regulatory codes which set minimum acceptable standards in which various activities are allowed. These codes function interactively to provide a protective net for groundwater and the environment.

State regulations that manage potential pollution sources which affect groundwater directly or indirectly can be grouped generically into four categories: waste disposal, agriculture, hazardous materials and waste, and other activities. The direct and indirect state regulatory management tools are listed in Appendix 7. This listing includes the type of activity being regulated, the regulator, specific Administrative Code number and the focus of the regulation.

In the future, as the importance of WHP is recognized, it is intended that regulations and administrative rules be amended to reflect the importance of WHP. These amended rules and regulations will have an influence on specific land uses within a WHPA.

In all cases, future public water supply wells are protected from encroachment by new potential sources of contamination. In a similar manner, new water supply wells may not be located so as to create a threatening situation with respect to existing potential contaminant sources. This approach will prevent or greatly lessen the likelihood of well contamination by the most direct means.

The WDNR will launch an educational campaign and provide technical assistance to the public, local officials, owners, and operators of public water systems to ensure success of the WHPP. This support will initially be in the development of educational materials to increase the public awareness of the issue and its direct implications on their health and future. The WDNR intends to work with interested communities that request assistance in selecting the most effective management strategies for their particular hydrogeologic setting, which will complement the state management plan. Since staffing for the WHP program is limited, this assistance will be done as time permits.

Examples of what is planned for the educational campaign are:

- 1) Development and maintenance of a wellhead protection web page including:
 - Detailed information on how to begin a WHPP and why it is important to communities in the state
 - Detailed information on how to inventory potential contaminant sources
 - Steps to be taken by a community to implement a WHPP
 - A compendium of ordinances that have been used by communities across the nation, with a section of ordinances that have already been put into effect in the state representing the array of options available to communities pursuing WHP.
- 2) Develop and provide training courses to water purveyors, WDNR staff and consultants on the elements of WHP. The programs will range from very general "what is WHP" format, to a detailed training program for those interested in developing a specific community's WHPP. This is occurring and is expected to be a continual education effort.
- 3) Promote the implementation of WHP across the state. This is occurring and is expected to be a continual education effort.
- 4) Provide to the public water purveyors accurate lists of existing potential contamination sources. The WDNR will provide detailed lists of the existing potential contamination sources which are listed in Table 3 numbers 1 through 12. This began in 1992 and continues with updated lists as they become available.

The state's information and education campaign for WHP is aimed at all public water supply wells and its continued protection of groundwater and the other natural resources will provide the foundation for a successful WHPP. To insure acceptance of any WHP program, local water purveyors will need to build on this framework and use these educational documents to enhance the awareness of the public. Many of the above mentioned educational documents and activities are being produced by the combined effort of the: CWGC, WRWA, WGNHS, WDNR, Natural Resources Conservation Service, the University of Wisconsin and its extension offices. The communication and cooperation that now exists between these organizations will continue as the implementation of the WHPP progresses.

Under the facilitated incentives approach for geographic priority areas, Wisconsin has identified subwatersheds with nitrate contamination approaching unsafe levels in public water systems. Subwatersheds with the largest number of such systems have been analyzed for the presence of sensitive receptors such as schools and daycares; impaired waters; wastewater dischargers eligible for nutrient trading (discharges to streams with phosphorus loads more than 50% from nonpoint sources); availability of hydrogeologic data and models; and project management capability. With input from a diverse panel

of experts and meetings with local watershed and water system officials, pilot geographic areas will be selected. A project manager will begin local outreach and data gathering on nitrogen input while wellhead delineations, monitoring and modeling are begun. Nitrogen load reductions necessary to maintain compliance with Safe Drinking Water Act standards will be calculated and individual landowner reduction plans developed. Estimated cost of reductions will be compared to water treatment costs. Where cost beneficial, test practices, loan guarantees, crop insurance and similar financial mechanisms will be developed. Where nitrogen contributors agree to sufficient reduction agreements to achieve the target reduction, the project manager will be funded to implement reduction practices. Monitoring will continue to determine nitrogen input and groundwater and drinking water nitrogen concentrations. Nitrate is the most pervasive groundwater contaminant in Wisconsin, causing serious, acute illness in infants and chronic effects for everyone who drinks nitrate-contaminated water. Ultimately, both the methods and the experiences of the initial selected geographic area will be transplanted to other geographic areas and adapted to avoid Safe Drinking Water Act violations for contaminants in addition to nitrate.

Groundwater does not respect political boundaries. Water that is consumed in Wisconsin may originate in another state or lies under one of the 8 Indian reservations that are found in Wisconsin. Conversely, Minnesota, Illinois, Michigan, or any of the Reservations may use water that originates in Wisconsin or off reservation. The effective resolution to any interjurisdictional issue is to involve all of the effected parties at the beginning of the planning stage. Cooperation is the key to the resolution of interjurisdictional issues. In cases of interjurisdictional issues between Wisconsin and neighboring states or tribal governments, the WDNR intends to coordinate with similar programs which may be developed by adjacent states and the tribal governments. The state or tribal government which has jurisdiction over the land or land use in question, will have the authority for the final decision.

Local Management

The local water purveyors will be the key element in the success of the voluntary wellhead protection program. Their involvement during the implementation of any specific WHPP will lead to the success of the program. Additional management of materials and land use within wellhead protection areas, beyond the state's management, will be primarily the responsibility of the local water purveyor. For the owners of the OTMs and non-community water systems, their primary option is non-regulatory. The WDNR intent is to supply them with technical assistance documents which will help them work with their local government and neighbors to increase protection of their water supply.

Two basic management approaches can be used separately or concurrently by local governments to protect groundwater. These approaches are that of regulatory and non-regulatory. An explanation of the various elements, or tools at the disposal of the local water purveyor is listed below.

Regulatory Tools

Through the enabling powers of local government, potential and actual threats to groundwater can be effectively regulated. Counties are much more limited, than cities, villages, and towns with village powers (hereafter collectively referred to as municipalities) in the range of powers they possess. A county (and town without village powers) must be authorized by statute to adopt regulations, whereas municipalities have broad statutory home rule powers. Local regulatory protection of groundwater has not been extensively tested in state courts. There may be gray areas in which the legal extent of regulation is questionable although the power to regulate is clearly authorized.

As part of Wisconsin's 1984 comprehensive groundwater law, Act 410, the power of local government to utilize zoning authority for groundwater protection purposes was clarified. State zoning laws for counties (in s. 59.97(1), Wis. Stats.), villages (s. 62.23(7)(c), Wis. Stats.) contain specific reference to "protection of groundwater resources" as one of the purposes of local zoning.

The following are regulatory options for groundwater protection available to municipalities:

1) Municipal Zoning

Zoning is an important tool for regulating new land uses and has a variety of applications to wellhead protection. Three basic approaches that can be used either separately or in combination are discussed below:

Revision of Existing Zoning Ordinance

Review and revise zoning district boundaries to make sure the wells and WHP areas are within districts compatible with groundwater protection.

Enact Overlay Zoning

Overlay zoning districts set additional requirements over those of the underlying zoning districts.

This approach allows municipalities to avoid overly broad regulations by limiting the most restrictive controls to areas with the greatest need for protection.

Define Conditional Uses Within the Zoning Ordinance

This approach offers flexibility because it is not strictly prohibitive - certain uses are still allowed as long as they meet specifically defined requirements.

Zoning and subdivision ordinances can be amended to require developers to install monitoring wells in areas of known abandoned waste sites. The developer could be required to prove that groundwater in the area is not polluted before any proposed zoning changes are authorized.

Major limitation with zoning: uses in existence before the passage of new zoning regulations are often permitted to continue as nonconforming uses.

2) Municipal Extraterritorial Zoning

This type of zoning may be useful when a municipal well or its zone of contribution is beyond municipal boundaries.

Extraterritorial authority for a first, second, or third class city extends up to 3 miles beyond city limits; fourth class cities and villages can regulate up to 1.5 miles beyond their boundaries.

Interim zoning by the city or village can be adopted for a maximum of two years without the consent of the affected town. Present zoning in the affected area is frozen while a comprehensive zoning plan is prepared. For the extraterritorial zoning to become permanent after two years, it must be approved by a majority vote of a six-member committee composed of three town and three city (or village) representatives.

Extraterritorial zoning enables cities and villages to take emergency action to control land uses affecting their groundwater quality. This power has not been widely used in Wisconsin.

3) Municipal Subdivision Ordinances

These ordinances regulate how larger tracts of land are subdivided for sale or development. Subdivision regulation has traditionally focused on residential development, but it can also apply to commercial and industrial development.

State subdivision regulations are described in Wisconsin Statute 236. Municipalities with a planning agency may enact subdivision ordinances which are more restrictive than these statutory provisions.

4) Municipal Extraterritorial Subdivision Regulations

Extraterritorial authority is the same as for extraterritorial zoning.

5) Municipal Hazardous Substance Ordinance

Such an ordinance could do some or all of the following: identify hazardous substances, require reporting by new and existing businesses, establish standards for storage and handling, require contingency plans in case of spills, and provide for inspection and enforcement.

Automobile salvage yards could be regulated under this ordinance or under a separate ordinance authorized by s. 175.25, Wis. Stats.

Limitations of such an ordinance: self-reporting by existing facilities may be ineffective, and identifying substances to be regulated, setting storage and handling requirements, and inspection all require technical expertise and can be expensive.

6) Municipal Underground Storage Tank Ordinance

Such an ordinance would supplement non-technical aspects of the Department of Industry, Labor and Human Relations (**now Commerce**) regulations.

7) Municipal Hazardous Waste Ordinance

Such an ordinance would regulate small quantity generators not covered by State and Federal regulations.

Counties have some powers of regulation regarding groundwater not authorized to municipalities. The following is a summary of the enabling powers of counties to help protect groundwater:

1) County Zoning

Covers all areas of a county except for those municipalities which have enacted their own zoning ordinances.

2) County Subdivision Ordinance

Such an ordinance would be similar to that described for municipalities

3) County Well Code Ordinance

Counties may adopt and enforce a county well code which must conform to WDNR rules in ch. NR 812, Wis. Adm. Code

Five levels of county involvement are described in ch. NR 145, Wis. Adm. Code:

1. Private well location and well abandonment.
2. Well location and pump installation permits.
3. Existing private and noncommunity water systems.
4. Private well construction.
5. Well and drillhole abandonment.

Counties may be authorized to administer at level 5, or at one or more of the other 4 levels.

Two limitations of this ordinance: inspection would probably require additional staff and special training, and the ordinance must be applied countywide - cities, villages, and towns cannot adopt well codes.

4) County Septage Ordinance

Counties may adopt an ordinance regulating the land disposal of septage. Site criteria and disposal procedures must be identical to WDNR rules in ch. NR 113, Wis. Adm. Code. The ordinance requires a soil test and annual license for each site and the county must maintain records of soil test results, site licenses, inspections, and enforcement actions.

If the county does not adopt a septage ordinance, cities, villages, and towns may do so.

5) County Animal Waste Storage Facility Ordinance

Counties may adopt an ordinance that requires all earthen animal waste storage facilities to meet minimum design and siting criteria. Standards for land application of livestock waste could also be specified.

6) County Hazardous Substance Ordinance

Such an ordinance would be similar to that described for municipalities.

Counties could regulate automobile salvage yards under this ordinance or under a separate ordinance specified by s. 59.07(38), Wis. Stats.

A summary of local regulation related to groundwater protection is listed in Appendix 8.

Potential problems exist in the implementation of WHP programs which cross local government jurisdictions. The most evident of these is with a well located near the edge of a municipal boundary. If the well's cone of depression would not be outside of the municipality the wellhead protection area certainly would. In this case, the municipality, by extraterritorial zoning, has the authority to create ordinances to protect the WHPA, but does not have the authority to insure that its neighbor will participate in the overall wellhead protection strategy after a two year period.

For the extraterritorial zoning to become permanent after two years, it must be approved by a majority vote of a six-member committee composed of three town and three city (or village) representatives.

This committee will have to be convinced that there would be a benefit to all parties involved for them to allow the continuation of the zoning. A substantive benefit could be in future water allocation or the preservation of a natural resource. Although these benefits exist they may not be deemed worthy of the merit needed to allow the continuation of zoning to protect the WHPA.

It must also be noted that even though municipal extraterritorial zoning exists it has not been widely used in Wisconsin.

Non-Regulatory Tools

State and local governments can also protect groundwater through non-regulatory approaches. Listed below are some general suggestions of administrative and educational programs which can be implemented. Programs must be tailored to fit the specific needs of a particular community.

Administrative Programs

- 1) Countywide Operation Clean Sweep program to facilitate the disposal of hazardous wastes for homeowners.
- 2) Provide a depository for hazardous wastes from local small quantity generators. A municipality would need a funding mechanism for permanent disposal of wastes.
- 3) Groundwater monitoring of sites in sensitive areas such as underground storage tanks close to a well, or monitoring for road salt near wells.
- 4) Reduction of salt usage on roads.
- 5) Establishment of inventories and record systems of underground storage tanks (those not already on the state list), above ground storage tanks, and abandoned or improperly constructed wells.

- 6) Incentive program providing monetary bonuses for the removal of underground storage tanks.

Educational Programs On:

- 1) Proper septic tank maintenance and the dangers of dumping hazardous materials into septic systems.
- 2) Proper storage and handling of hazardous materials by businesses and proper disposal of hazardous wastes by both businesses and households.
- 3) Leaking underground storage tanks, how they pollute groundwater and endanger drinking water supplies, methods of leak detection and how to prevent tanks from leaking.
- 4) Proper abandonment of water supply wells.
- 5) Agricultural best management practices, including proper storage, handling, and use of pesticides and fertilizers.
- 6) Drinking water quality in conjunction with area wide water testing programs.

Participation in Facilitated Incentives Projects can be undertaken at the local level using models developed by WDNR. Sources of public and private financing can be found to support project management, data collection, modeling, installation of practices and evaluation.

The WDNR intends to provide information and technical assistance to any community which expresses interest in one or many of the non-regulatory programs. It will be written into the general WHPP information documents that these programs are very important to the success of their WHP effort. The WDNR will continue to stress that these activities are not one time operations, but are far more successful in protecting the groundwater resource, when they are used as routine programs by the community.

To facilitate the use of the non-regulatory tools available to the local governments, the WDNR has established a general timeline in order to ensure continued use of these tools:

- 1) Assessment of policy and practices with responsible state program managers. This includes but is not limited to pesticide use, septic systems, and road salt application.
- 2) Determine if key information is reaching local governments public water purveyors, engineering and planning consultants and similar key audiences. The Planning and Outreach Subcommittee of the Groundwater Coordinating Council will be consulted periodically to assess the audiences reached and the information available.
- 3) Use the sanitary survey process to assess and promote WHP activity on an ongoing basis with all public water systems.

The options implemented by the municipalities for the management of WHPAs will depend on the current land uses, the types of potential pollution sources identified during the contaminant source inventory, and the success of the WDNR's informational and educational outreach. Due to each differing circumstance a municipality may choose to use some, all, or any combination of the non-regulatory tools.

State & Local Management

The local management efforts will build on and complement the regulatory foundation that the state has provided. The importance of the local water purveyors and citizens of the communities is monumental. The local ordinances will supplement the state regulations and would enhance the successful state WHPP. In addition, without the citizens, their energy, and time commitment to actively participate in protecting the resource, undoubtedly, this program would not achieve its ultimate goal.

State management has provided the regulatory foundation to build a successful WHPP. Outreach with information and educational tools, technical assistance and guidance documents will be provided to local water purveyors and citizens of the state to encourage them to enhance the state WHP program.

The facilitated incentives approach for geographic target areas will serve as models for more intensive local projects.

The state intends to track local initiatives through the sanitary survey. The state will then make a determination as to the level of additional effort and the effectiveness of locally developed programs.

Contingency Plans.

The contingency plan for public water supply wells is an important feature in the wellhead protection program. Even though a water supplier develops an excellent management plan to prevent contamination, contamination of the potable water supply is still possible. Contamination could be due to spills, leaks of hazardous materials or other activities in and around the WHPA. For this reason the ability to respond to contamination threats to a well or well field is an essential component of a comprehensive wellhead protection management plan.

A contingency plan for providing safe drinking water has been in place in Wisconsin since October of 1984. This plan has ensured that safe drinking water is available to all residents of Wisconsin at all times. The contingency plan is entitled "Annex N - Emergency Water Supply Plan of the Wisconsin Emergency Operations Plan". This contingency plan was cooperatively developed by the U.S. Army Corps of Engineers, Wisconsin Division of Emergency Government, and the Department of Natural Resources. The plan is attached as Appendix 9.

The WDNR will disseminate educational materials and information to encourage water purveyors to develop enhancements to the State's successful contingency plan, which already protects the health and safety of its citizens. This will be an ongoing endeavor through out the duration of the wellhead protection program. A community may want to develop a plan to follow in the event of an accidental spill or if it is determined that their water supply becomes contaminated. In this supplemental plan the community may want to develop a list of equipment and operators that may be utilized in the event of a spill in the community. They may also want to negotiate with a neighboring community to provide a long term source of potable water if their supply becomes contaminated. A complementary contingency plan to Annex N - Emergency Water Supply Plan, may be developed by the water purveyor to provide additional protection for providing safe drinking water to the service area. This complementary contingency plan would be designed to meet the specific needs of the community determined by its site specific characterization. The state provided contingency plan includes all public water supplies. If a water quality problem or contamination event occurs then all that a water purveyor must do is contact the lead worker designated in Annex N and actions to provide potable water for the area will be initiated.

Protection of New Wells.

All new municipal water systems will be required to have a wellhead protection plan. The plan shall be developed by the municipality or their agent. No new municipal system shall be placed into service until the WDNR has approved the wellhead protection plan. Once the plan has been approved, the WDNR has made the decision that the well (and its associated wellhead protection area) will be adequately protected by the approved wellhead protection program.

The requirement of submittal of a wellhead protection plan for new municipal systems is specified in chapter NR 811, Wis. Adm. Code, which pertains to the requirements for the operation and design of community water systems. The revision to ch. NR 111, Wis. Adm. Code, which has been renumbered to ch. NR 811, Wis. Adm. Code, incorporates the wellhead protection regulation and went into effect April 1, 1992. Appendix 4 contains the specific provisions in ch. NR 811, Wis. Adm. Code, that are related to wellhead protection. Two specific provisions of NR 811 require a potential contaminant source inventory for an area with a .5 mile radius around the well and the more advanced delineation must be based on a minimum of a 5-year time of travel.

Wellhead protection plans for new municipal wells will be reviewed by staff in the Bureau of Water Supply (**now Bureau of Drinking Water and Groundwater**) to see if they meet the requirements set forth in ch. NR 811, Wis. Adm. Code. In addition, the plans will be evaluated to determine if information available identified within this program plan has been incorporated in the new municipal wells protection plan and to what extent the submitter has used the avenues of information regarding contamination sources developed by the Bureau of Water Resources Management (**now Bureau of Drinking Water and Groundwater**). Acceptable delineation methodology will be evaluated on a site by site basis, in addition to other site specific information such as land control at the well site. Management approaches proposed by water purveyors will each be evaluated independently to determine if adequate protection of the resource has been insured taking into account the site specific conditions that exist.

Public Participation.

Government agencies dealing with the environment are, by law, responsible to the public. To ensure that citizens have a voice in agency actions, the WDNR provides opportunities for citizens to influence and facilitate policies, regulations, and legislation.

The public has been involved extensively in the development and the implementation of the pilot studies on wellhead protection in Wisconsin. Its primary involvement was through several steering committees. These committees were tapped for input both during the development and implementation of the WHP program pilot projects.

The pilot project committee members were from the municipalities which the WHPA was being delineated and citizens from the surrounding townships. The purpose of the committees was to provide input supporting the interest of their respective communities and to fully implement a WHP plan. The involvement of the steering committees not only fulfilled its purpose, it was also a two way educational tool on the obstacles to development of WHPAs. The involvement of the public during the pilot studies has shown that it is an intricate link in the success of any future wellhead program.

Several committees were involved in the development of the wellhead protection program. These committees represent state, university and citizens of the state. Their input not only indicated that all facets of the state's regulation and authority be considered when developing the WHPP but because of the widespread impact of the program, a phased in implementation approach with the additional development of a WHP database is needed.

In addition to the pilot studies the public was also involved during the development of the WHPP. The following is a listing of other times in which the public was involved.

May 23, 1990. The Wisconsin Chapter of the American Water Works Association held a spring seminar. The members attending the meeting were primarily operators and administrators of municipal water supplies. Half of the meetings focus was on wellhead protection. Presentations were made by representatives of the WDNR and the WGNHS.

September, 1990. The American Water Works Association held their annual meeting. Several hundred members were there for a discussion on the proposed design criteria, including the requirement of a wellhead protection plan, for each new public water supply wells.

February, 1991. A meeting was held with nearly 100 statewide consultants and administrative municipal officials to discuss the proposed design criteria, including the requirement of a wellhead protection plan, for each new public water supply well.

April 17, 1991. A meeting was held with a representative of the Wisconsin Rural Water Association to discuss how the WDNR and the staff of the Association could better promote wellhead protection.

May 17, 1991. A meeting was held with nearly 100 local officials and concerned citizens attending. The meeting was targeted toward transmitting information to local officials on the steps that are involved when developing a wellhead protection plan. Presentations outlined sources of available material and access routes to professional expertise which could aid in the development of WHP plans. In addition, a panel discussion, of actual experiences, on the pitfalls

associated with the implementation of wellhead protection implementation was presented.

June 21, 1991. Notices were sent to over 600 consulting engineers, water well drillers and owners of municipal water systems to announce the public hearings and comment period for Chapter NR 811.

June/July 1991. Over 250 copies of the proposed language for ch. NR 811, Wis. Adm. Code, were sent to consulting engineers and utility engineers that work with municipal water systems.

July 25, 1991. A meeting was held with representatives from the WDNR, University Wisconsin system, Central Wisconsin Groundwater Center, U.S. Soils Conservation Service and the Wisconsin Rural Water Association. Discussion focused on the future development of WHP in Wisconsin. The representatives also related what they had learned, over the past year, regarding experiences gained by implementing WHP projects.

September 20, 1991. A presentation, at the Annual meeting of the American Water Works Association, on the impacts of implementing the proposed ch. NR 811, Wis. Adm. Code, including the requirement of a wellhead protection plan submittal in the design phase of every new municipal water supply.

October, 1991. Incorporated comments from public hearings into the proposed language for ch. NR 811, Wis. Adm. Code. This code regulates the installation of municipal water supplies. Language was incorporated into the code which requires a wellhead protection plan to be submitted and approved prior to the installation of any new municipal water supply.

October 24, 1991. Chapter NR 811, Wis. Adm. Code, was taken to the Natural Resources Board for approval. The Board approved the code as submitted. It is expected that it will go into effect in early 1992.

November 6, 1991. A meeting was held with representatives from the WDNR, University of Wisconsin System, Central Wisconsin Groundwater Center, U.S. Soils Conservation Service, Golden Sands Resource Conservation & Development and the Wisconsin Rural Water Association. The primary reason for the meeting was to discuss the cooperative development of a 30 second television commercial introducing wellhead protection to the citizens of the state. In addition, each representative also related what they had been involved with, since our last meeting, regarding WHP.

November 7, 1991. Meeting with EPA representatives to review the draft WHPP which Wisconsin submitted.

November 19, 1991. Subcommittee of November 6, 1991 group, listed above, met to discuss specifics of WHP television promotion. The television commercial will be produced in early 1992.

December 5, 1991. Participated in informational seminar put on by the Wisconsin Rural Water Association for operators and managers of municipal water supplies. The goal of this seminar was to introduce WHP to interested parties. Information provided focused on process of basic groundwater movement and the various techniques to delineate WHPAs.

December 11, 1991. Presentation of State and Federal initiatives regarding WHP to citizens in

Stevens Point.

December 16, 1991. Discussed with Director of the Central Wisconsin Groundwater Center what would be the most useful information the WDNR could provide to the parties involved with implementing WHP. In addition, requested his opinions on what delineation methods would be the most realistic to include the state's program given the amount of funding available.

January 8, 1992. Meeting with representatives of the Wisconsin Geological and Natural History Survey to get their input on what delineation methods would be the most realistic to include in the state's program given the amount of funding available. The representatives also gave time estimates for the implementation of differing delineation methods.

January 8, 1992. Participated in a WHP educational evening organized by the Wisconsin Rural Water Association to introduce of the components of a WHPP to public water purveyors and city/town board members.

January 15, 1992. Telephone conference with representative from Minnesota Department of Health to compare development of both states WHP programs.

January 21, 1992. Discussed with the Wisconsin Rural Water Association what information should be developed to supplement the information provided in the first draft of the state's WHPP to facilitate present and future implementation of the program.

February 14, 1992. A presentation and discussion of the proposed WHPP was given to Wisconsin's Groundwater Coordinating Council. The council indicated that WHP was an important issue for Wisconsin.

February 18, 1992. A meeting was held with WGNHS to discuss issues regarding delineation methodology, responsibilities, and roles of agencies regarding the development and implementation of the WHPP.

April 28, 1992. Presentation on WHP to state regulatory affairs seminar. Over 300 regulators, water purveyors, private engineers, and others were in attendance.

May 20, 1992. Distribution of a WHP pamphlet to University of Wisconsin-Extension offices.

May, 1992. Airing of 30 second television advertisement introducing the concept of WHP to the population of the state. The television advertisement was shown statewide on 5 channels during the month of May.

On November 10th and 12th of 1992 the complete Wisconsin wellhead protection program was presented at public hearing in the cities of Madison and Wausau, Wisconsin. Citizens were, at that time, provided an easy access route to put their input into the state's program. The WDNR actively sought input into the WHPP from all interested parties. To facilitate the public's awareness of the public hearings, the WDNR publicly noticed the meeting in the October issue of the Wisconsin Outdoors and Conservation News. This notification was sent to newspapers, radio and television stations. In addition, a meeting notice was mailed to each county planning and zoning office; local health departments; regulatory planning commissions; zoning administrators; public water supply engineers; public water supply operators; and other interested parties. The proposed program was mailed to everyone that requested it.

The WDNR received public comments at the hearings and by mail. The comments were reviewed, evaluated for merit and incorporated into the WHPP to the greatest extent possible. Both the comments and the written responses to each comment can be found in Appendix 10. Overall the comments were in support of the program as proposed.

The public has clearly shown that the protection of drinking water quality and groundwater resources is a priority. Indicators of public support include, support for regulatory and remedial activities regarding pollutant sources and activism regarding the protection and treatment of water supplies. However, at the same time, most people would not recognize the term "Wellhead Protection" and are not aware of the WHPP's fundamental components. Public education and public participation will be essential for broad understanding, acceptance and support of the WHPP, and to ensure widespread implementation of local programs.

In addition to the public being involved in the state rule making process, successful implementation of wellhead protection will depend heavily on the participation of each community.